

# Claims

- [c1] 1. An intermeshing gear pump comprised of an outer housing defining a pumping cavity in which a pair of intermeshing gears are journaled for pumping a fluid from a fluid inlet to said pumping cavity to a pumping outlet from said pumping cavity, said intermeshing gears having end faces at opposite sides of said gears extending perpendicularly to the rotational axes of said gears, said outer housing comprising a main body part and a pair of separate end plates affixed thereto, said main body part having an opening extending axially therethrough defining a portion of said pumping cavity facing the circumferential peripheral surfaces of said gears, said end plates each closing a respective side of said main body part opening and being in confronting relation to respective of said gear end faces for closing said pumping chamber, and a fastener arrangement for affixing said end plates and said main body part together.
- [c2] 2. An intermeshing gear pump as set forth in claim 1 wherein a fluid passage in the form of a groove is formed in one side of the main body part communicating with the pumping cavity and is closed by one of the end

plates and the one of the end plates is formed with a fluid passage passing therethrough and communicating with said groove.

[c3] 3.An intermeshing gear pump as set forth in claim 2 further comprising a check valved passage formed in the one end plate for providing one way fluid communication with the groove.

[c4] 4.An intermeshing gear pump as set forth in claim 3 wherein a second fluid passage in the form of a second groove is formed in one side of the main body part communicating with the pumping cavity and is closed by one of the end plates and the one of the end plates is formed with a fluid passage passing therethrough and communicating with said second groove.

[c5] 5.An intermeshing gear pump as set forth in claim 4 further comprising a check valved passage formed in the one end plate for providing one way fluid communication with the second groove.

[c6] 6.An intermeshing gear pump as set forth in claim 5 wherein the groove and the second groove are formed in the same side of the main body part and are both closed by the same end plate.

[c7] 7.An intermeshing gear pump as set forth in claim 1

wherein at least one of the gears is detachably supported on a shaft journaled by the end plates.

[c8] 8. An intermeshing gear pump as set forth in claim 7 wherein the at least one of the gears forms a bore extending therethrough to receive the shaft, one end face of said one gear forming a slot extending perpendicularly to said bore, a coupling pin extending through said shaft and having at least one end portion received in said slot for non-rotatably coupling said shaft and said one gear.

[c9] 9. An intermeshing gear pump as set forth in claim 7 both of the gears are detachably supported on respective shafts journaled in the end plates, each of said gears being formed with a bore extending therethrough to receive the respective shaft, one end face of each of said gears forming a respective slot extending perpendicularly to its bore, a pair of coupling pins each extending through a respective one of said shafts and having at least one end portion received in its slot for non-rotatably coupling the respective of said shafts and said gears.

[c10] 10. An intermeshing gear pump as set forth in claim 1 wherein at least one of the end plates is in direct engagement with the respective gear end faces.

- [c11] 11. An intermeshing gear pump as set forth in claim 10 wherein both of the end plates are in direct engagement with the respective gear end faces.
- [c12] 12. An intermeshing gear pump comprised of an outer housing defining a pumping cavity in which a pair of intermeshing gears are journaled for pumping a fluid from a fluid inlet to said pumping cavity to a pumping outlet from said pumping cavity, said intermeshing gears having end faces extending perpendicularly to the rotational axes of said gears at at least one side of said gears, said outer housing comprising a main body part defining at least in part said pumping cavity and an end plate affixed thereto and closing said pumping cavity, at least one of said gears forming a bore extending therethrough to receive a shaft, said end face of said one gear forming a slot extending perpendicularly to said bore, a coupling pin extending through said shaft and having at least one end portion received in said slot for non-rotatably coupling said shaft and said one gear.
- [c13] 13. An intermeshing gear pump as set forth in claim 12 wherein at least one of the end plates is in direct engagement with the respective gear end faces for retaining the pin in the slot.

- [c14] 14. An intermeshing gear pump as set forth in claim 12 wherein both of the gears forming a bore extending therethrough to receive a shaft, one end face of each of said gears forming a slot extending perpendicularly to the respective bore, a pair of coupling pins each extending through a respective of said shafts and having at least one end portion received in the slot thereof for non-rotatably coupling said shafts and said gears.
- [c15] 15. An intermeshing gear pump as set forth in claim 14 wherein at least one of the end plates is in direct engagement with the respective gear end faces for retaining the pins in the slots.
- [c16] 16. An intermeshing gear pump comprised of an outer housing defining a pumping cavity in which a pair of intermeshing gears are journaled for pumping a fluid from a fluid inlet to said pumping cavity to a pumping outlet from said pumping cavity, said intermeshing gears having end faces extending perpendicularly to the rotational axes of said gears at opposite sides of said gears, said outer housing comprising a main body part and a pair of separate end plates affixed thereto, said main body part having an opening extending axially there through defining a portion of said pumping cavity facing the circumferential peripheral surfaces of said gears, said end plates each closing a respective side of said main body

part opening and being in direct engaging relationship to respective of said gear end faces for closing said pumping chamber, and a fastener arrangement for affixing said end plates and said main body part together.

- [c17] 17.A method of forming an intermeshing gear pump comprised of an outer housing defining a pumping cavity in which a pair of intermeshing gears are journalled on respective shafts for pumping a fluid from a fluid inlet to the pumping cavity to a pumping outlet from the pumping cavity, the intermeshing gears having end faces extending perpendicularly to the rotational axes of the gears at opposite sides of the gears, the outer housing comprising a main body part and at least one separate end plate affixed thereto, the main body part having an opening extending axially therein defining a portion of the pumping cavity facing the circumferential peripheral surfaces of the gears, the end plate closing a respective side of the main body part opening and a fastener arrangement for affixing the end plate and the main body part together, said method comprising the steps of placing a pair of plates in abutting relationship, affixing said plates against transverse movement relative to each other, drilling a pair of holes through the plates from one side of one of the plates and ending through the oppositely facing side of the other of the plates so that any

burrs formed by the drilling operation will be formed on the oppositely facing side of the other of the plates, machining a cavity in at least the oppositely facing side of the other of the plates of sufficient size to form the pumping cavity and in an area encompassing that of the previously drilled holes to remove any burrs formed by the drilling operation and form the main body part, and placing and affixing the one plate against the main body part in closing relation to the pumping cavity formed therein to form the end plate therefor.

[c18] 18.A method of forming an intermeshing gear pump as set forth in claim 17 wherein the plates are positioned with the drilled holes formed therein in alignment.

[c19] 19.A method of forming an intermeshing gear pump as set forth in claim 18 further including the step of placing the gears in the pumping cavity of the of the main body part before the end plate is affixed thereto.

[c20] 20.A method of forming an intermeshing gear pump as set forth in claim19 wherein the drilled holes have a diameter and spacing to accommodate the gear shafts.

[c21] 21.A method of forming an intermeshing gear pump as set forth in claim 20 wherein the gear shafts are positioned with the gears before the end plate is positioned

against the main body part.

- [c22] 22.A method of forming an intermeshing gear pump as set forth in claim 21 wherein the gears and shafts are separate from each other and further including the step of forming bores in the gears for receiving the respective shafts and non-rotatably affixing at least one of the gears to its shaft.
- [c23] 23.A method of forming an intermeshing gear pump as set forth in claim 22 wherein the one gear is non-rotatably affixed to its shaft by forming a slot in one end face of the gear extending perpendicularly to the bore, positioning a coupling pin through the shaft and having at least one end portion received in the slot for non-rotatably coupling the shaft and the one gear and retaining the pin by the positioning of the end plate.
- [c24] 24.A method of forming an intermeshing gear pump as set forth in claim 22 wherein both of the gears are non-rotatably affixed to their respective shaft by forming a slot in one end face of each gear extending perpendicularly to its bore, positioning a coupling pin through each of the shafts and having at least one end portion received in said slot for non-rotatably coupling the shaft and the one gear and retaining the pin by the positioning of the end plate.



[c25] 25.A method of forming an intermeshing gear pump as set forth in claim 17 wherein the machining of the cavity is continued entirely through the main body part.

[c26] 26.A method of forming an intermeshing gear pump as set forth in claim 25 wherein the machining is also continued to form a cavity in one side of the end plate.

[c27] 27.A method of forming an intermeshing gear pump as set forth in claim 26 wherein the other side of the end plate is positioned in closing relation to the main body part cavity.

[c28] 28.A method of forming an intermeshing gear pump as set forth in claim 25 further including the step of placing a third plate in abutting relation to one of the pair of plates before the drilling and machining and the pair of holes are drilled through all of the plates and after the machining the third plate is positioned in abutting relation to the side of the main body part opposite the first piece to form a second end plate for the main body part cavity.

[c29] 29.A method of forming an intermeshing gear pump as set forth in claim 28 wherein the machining is also continued to form a cavity in one side of the first end plate.